The influence of the illumination geometry and luminance contrast on gloss perception

F. B. Leloup [A,B], M. R. Pointer [C], P. Dutré [B], P. Hanselaer [A,D]

[A] Light & Lighting Laboratory, Catholic University College Sint-Lieven, Belgium
[B] Computer Graphics Research Group, K. U. Leuven, Belgium
[C] Department of Colour Science, University of Leeds, United Kingdom
[D] Department of Electrical Engineering (ESAT), K.U. Leuven, Belgium

Gloss is one of the main characteristics that determine the appearance of an object. Physically, gloss results from directionally selective light scattering at the front surface of a material, with a preference towards the specular reflection direction. However, the sample illuminance and consequently the entire luminance distribution of the illumination scene around the sample could strongly influence gloss perception, especially for high glossy surfaces on which a reflected image becomes perceptible.

The rear side of three flat glass samples was respectively painted white, grey and black, approximately resulting in equal steps in lightness. A light booth comprising two tunable light sources was designed. The mirror image of only one light source was visible in reflection by the observer. By separate adjustment of the intensity of both light sources, the luminance of the reflected image and the adjacent surroundings could be individually varied.

Ten observers rated the glossiness of each of the three samples twice for sixty-five different illumination settings, using magnitude estimation. A psychophysical scaling function that relates visual gloss perception to the luminance of the reflected image and the off-specular surround was derived with least squares fitting techniques. The observer accuracy and reliability were evaluated by the coefficient of variation.

Keywords: Contrast; Brightness, Lightness